PRE-ANNEAL OF $CoSi_2$ TO PREVENT FORMATION OF AMORPHOUS LAYER BETWEEN Ti-O-N AND $CoSi_2$

ABSTRACT OF THE DISCLOSURE

The present invention provides a method for forming an interconnect to a cobalt or nickel silicide having a TiN diffusion barrier. The inventive method comprises providing an initial structure having vias to exposed silicide regions positioned on a substrate; annealing the initial structure in a nitrogen-containing ambient, wherein a nitrogen passivation layer is formed atop the exposed silicide region; depositing Ti atop the nitrogen passivation layer; annealing the Ti in a nitrogen-containing ambient to form a TiN diffusion barrier and an amorphous Ti cobalt silicide between the TiN diffusion layer and the cobalt or nickel silicide and depositing an interconnect metal within the vias and atop the TiN diffusion barrier. The nitrogen passivation layer substantially restricts diffusion between the Ti and silicide layers minimizing the amorphous Ti cobalt silicide layer that forms. Therefore, the amorphous Ti cobalt or Ti nickel silicide is restricted to a thickness of less than about 3.0 nm.